



North Sea Region Transport and Environment

Sustainability concepts, criteria and the use of indicators

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NORTH SEA REGION TRANSPORT AND THE ENVIRONMENT

- Sustainability concepts, criteria and the use of indicators

Annex 1.2.3 to the Final Report



May 2007



PREFACE

This paper has been written as part of the SUTRANET project (Work Package 1: Transport Research and Development Network). SUTRANET (**S**ustainable **T**ransport Research & Development **N**etwork in the North Sea Region') is a project within the framework of the European Commission's (EC's) Interreg IIIB North Sea Programme.

The aim of the paper is to establish sustainability concepts, criteria and general indicators for transport in the North Sea Region and for use in the SUTRANET project.

The paper has been elaborated by a team of researchers at Aalborg University, Department of Development and Planning. It has benefited from useful comments and contributions received from other partners of SUTRANET.

Aalborg University, Department of Development and Planning
May 2007

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1 INTRODUCTION

The paper provides a basic vocabulary for discussing and applying sustainability aspects in relation to the transport sector in general as well as in relation to more specific cases of transport activities. In doing so, a main focus on sea transport and port-related transport activities will occur. Due to the basic and general character of the issues discussed in this paper, it is the intention that other SUTRANET papers, or other publications referring to this paper, will identify and apply more specific sustainability criteria and indicators that matches more concrete and situation specific purposes. Two examples of this can be seen in the IVL papers produced as part of SUTRANET (IVL, 2007a & b).

The following section discusses the concept of sustainable development and delimits the use of the concept to a focus on environmental integration and environmental sustainability. The next section establishes a definition of environmentally sustainable transport. In the final section, suggestions are developed for some basic overall criteria and indicators of environmentally sustainable transport in the North Sea Region, in particular in relation to sea transport as well as port-related and intermodal transport activities.

2 SUSTAINABLE DEVELOPMENT

The concept of sustainability had a breakthrough when the World Commission on Environment and Development published *Our Common Future*, the so-called Brundtland report, in 1987. The main issue in the report was to work towards strategies for a sustainable development. The report stated that a sustainable development must meet the needs of the present generation without compromising the ability of future generations to meet their needs. It was a broad definition incorporating both living resource conservation as well as social and economic development. The attitude embedded in the report was that economic and social development could not be characterised environmentally sustainable.

Since the Brundtland report, sustainable development has been debated as a concept and a political strategy, and a large number of differing definitions and approaches have emerged. No commonly accepted definition has been established. However, it seems to be generally accepted (e.g. in OECD and EU documents) that sustainable development implies finding a proper balance between (current and future) environmental, social and economic qualities. It is less clear which environmental, social and economic qualities should be guaranteed and balanced (Himanen et al, 2004). Hence, sustainable development tends to function as an overall paradigm in politics, rather than a well-defined and easily applicable concept.

In the European Commission's Interreg IIIB North Sea Programme, sustainable development is one of four basic principles and is concerned with:

...the integration of environmental, economic and social issues. For example, the economic objectives of any project must be balanced against the environmental and social objectives of spatial development. Project work should preferably contribute to environmental, social

and economic goals and should not have a detrimental effect on any of these aspects. In this way balanced and sustainable spatial development can be achieved (Interreg IIIB North Sea Programme).

Still, the balancing and integration of environmental, economic and social goals and issues often prove to be a very complex matter, both in technical and political terms. No single sector (e.g. energy, transport, agriculture, etc.) can claim to have achieved a sustainable and balanced development. Disagreement and conflict over attempts to achieve such development surface for a number of different reasons. First of all, economic and environmental goals may oppose each other, despite many attempts to identify and implement win-win aspects and solutions. In addition, different sectors may find that their views and ideas of a sustainable development do not coincide; sometimes they even oppose each other, for instance in cases of dispute over the contribution of different sectors (such as construction, production, energy and transport) to emission reductions. Furthermore, attempts at fulfilling some environmental goals within a sector may actually work against fulfilling other environmental goals within the same sector. This is sometimes the case when considering different air emissions and CO₂ emissions – reductions in one type of emission may result in an increase in another type of emission, and vice versa. In other words, operationalising the balancing and integration of environmental, economic and social goals and issues requires extensive internal as well as external coordination and co-operation between sectors and political levels.

However, it is not the intention of the SUTRANET project to identify a definition of sustainable development that covers all the aspects mentioned above. SUTRANET has a transport sector-specific approach, and a main aim of the project has been to focus on more efficient and sustainable transport solutions in the North Sea Region. Such a focus requires the establishment of a workable definition of sustainable transport. Therefore, it is necessary to further delimit and discuss the notion of sustainable development in an attempt to clarify the relationship between the sector-specific approach and broader cross-sectored notions of sustainable development.

As indicated above, the Brundtland definition of sustainable development is very broad. It establishes the paradigm that the practices affecting the welfare of current generations should not threaten or reduce the welfare of future generations. The welfare aspect is then qualified further through the attention to economic, social as well as environmental issues.

This paper concentrates primarily on clarifying the environmental aspects of sustainable development, or more specifically environmental sustainability. It is not the intention to ignore economic and social welfare and development, but rather to be able to form comparatively well-defined criteria or indicators for working with sustainable transport in the North Sea Region. Focus is then on the integration of environmental issues into what seems to be a well-established and dominating sphere of economic and social development considerations in politics, policymaking and planning. Such an approach adheres to, or complements, what is often termed as environmental policy integration¹:

¹ See Annex A for an example of a framework for evaluating integration of environment into sector policies (from EEA, 2005).

The existence of a healthy environment is a necessary precondition for social welfare and economic development, and is also at the core of the sustainable development principle. While the social, economic and environmental elements of sustainable development are heavily interdependent, sustainability is simply not possible unless environmental issues are considered and reflected in social and economic activities and policies. Environmental policy integration or 'EPI' is about just that: taking environmental issues into account in the development and implementation of non-environmental policies (EEA, 2005).

Then, what can be considered environmentally sustainable? There is a discursive conflict in economics concerning weak versus strong sustainability. Adherents of weak sustainability claim that virtually all natural functions can be somehow substituted either within nature or with the aid of man made goods and services. In contrast, those that adhere to strong sustainability claim that the carrying capacity of ecological systems and of the entire Earth has absolute limits (Himanen et al, 2004. See also O'Riordan, 1996 and Pierce et al, 1994).

The discussion on weak versus strong notions of sustainability often revolves around arguments over the extent to which natural resources can or cannot be replaced by other natural resources, or by man-made resources (such as when discussing the function of certain important ecosystems and the function of the global climate, see Tengström, 1999). It implies attention to discussion of notions of a limited ecological space and to whether certain forms of natural capital can or cannot be replaced by alternative natural resources or manmade systems (see Hansen et al, 2000; Aall, 2004).

This paper is not promoting a specific stand or definition in relation to this debate. Rather, it is the intention to promote a move away from the current situation; a move towards increased environmental policy integration, as most researchers, politicians and planners seem to agree that the present environmental situation can and should be improved. Hence, it is the intention of this paper to contribute to an on-going process of introducing and imposing environmentally argued policy measures into the transport sector. The paper aims toward the operationalisation of the concept of sustainability so that it may be found useful primarily in relation to environmental policy integration in the transport sector. In doing so, it is considered a useful approach to try working towards solutions that aim at decoupling economic growth and social development from a growth in negative environmental impact.

3 ENVIRONMENTALLY SUSTAINABLE TRANSPORT

This section aims to establish a definition of sustainable transport within the above mentioned delimitations.² It implies the characterisation in general terms of the perspective, or concept, of environmentally sustainable transport. In doing so, some views developed by Tengström on sustainable transportation have been adapted, resulting in the following (Tengström, 1999):

Sustainability in transport should concern the transport system as a whole. The reason is that the meaning of sustainability refers to some ability of reproduction. A system may be sustainable if its components are replaced over time. A transport system that is long-term sustainable consists of components, which can be replaced successively by human actors, and is provided with some sustainable energy supply.

Such a perspective seems to be at level with the OECD qualitative definition of environmentally sustainable transport. The OECD identifies environmentally sustainable transport as transportation that does not endanger public health or ecosystems and meet needs for access consistent with: a) sustainable use of renewable resources at below their rates of regeneration; and b) use of non-renewable resources at below the rates of development of renewable substitutes. See OECD (2000).

Leaving aside the obvious objective of not endangering public health, an important incentive to aim towards environmental improvement is often argued to be related to conditions of uncertainty, or the experience of uncertainty. Tengström illustrates this through three points of concern (1999). First, the effects of human activity on nature are very difficult, if not impossible, to identify in detail. When applying the concept of sustainability, one must distinguish between natural and man-made changes of different systems. Second, theories are unable to make precise predictions of climate changes, changes to ecosystems, and the like. Third, changes of a system may be linear or non-linear. Given non-linear sudden negative changes in the global environment, provoked by activities caused by man, the ability for future generations to meet their needs could be compromised. Those are the conditions of uncertainty under which environmental policy making and planning has to be carried out. It implies that environmental research, as well as environmental policy and planning, probably never can be, and thus should not be, understood in exact terms, e.g. with precise predictions for the future. This has led to the promotion and application of precautionary principles in environmental politics – principles that attempt to take into account this uncertainty, e.g. by promoting CO₂ reduction goals.

Apart from a focus on the function of ecosystems and on human health, the above view from Tengström and OECD also indicates a focus on resource depletion and in particular on the issue of the vulnerability of the transport sector to the supply of oil. The transport sector continuously faces the threat of an oil crisis and/or significant raises in oil prices, which may either be the result of a lack of sufficient supply or the result of political tension. The current (2005-06) increase in oil prices seems to illustrate this. Hence, current attempts to reduce oil

² This section is mainly inspired by Hansen (2002), Hansen et al (2000), Tengström (1999) and Aall (2004).

use may not only reduce negative environmental impacts but also contribute to reduce economic vulnerability.

Another, and more practical, incentive for transport operators and the sector in general to move towards more environmentally friendly conditions is the issue of the continued sensibility of the transport sector towards environmentally argued political regulation. The transport sector is always sensible to political top-down regulations or demands of reductions in emissions, of better fuel efficiency, etc.

In SUTRANET it is an underlying intention to aid the adaptability of the transport sector to environmental issues; i.e. the capacity of governmental as well as non-governmental actors to meet environmental demands through concrete transport policies, plans, and initiatives (e.g. by provoking a different transport modal split, alternative fuels, recycling, etc.). Even if science never get to know the exact conditions for ecological equilibrium it seems entirely valid to proceed with processes where researchers, politicians, and planners work towards economic and social development conditions with less negative effect on the environment caused by human activity.

4 TOWARDS INDICATORS OF ENVIRONMENTALLY SUSTAINABLE TRANSPORT

Moving towards a reduced negative impact on the environment from transport activities requires: 1) environmental criteria and indicators related to transport activities; and 2) clearly defined goals related to those criteria and indicators. Indicators in particular are useful measures in enabling for instance decision-makers to assess progress towards the achievement of intended outputs, outcomes, goals, and objectives. Well-known environmental indicators are for instance air-emissions and CO₂-emissions, which are often applied in relation to goals of improving human health conditions and to goals concerning climate change, respectively. The relationship between environmental criteria and indicators is understood in terms of indicators being the more specific and measurable elements of overall criteria.

In order to build specific indicators of environmentally sustainable transport in the North Sea Region it is relevant to first discuss the overall character of environmental problems and resource depletion associated with the transport sector in general, as well as in relation to the context of the North Sea Region. Sustainable transportation might be considered by examining the sustainability of the transport system itself, focussing on the positive and negative values and externalities of traffic and transport as they are apparent now or in the near future (Himanen et al, 2004).

In general, transport has a growing share in the exhaustion of natural resources. The impacts of exhaustion typically threaten to reduce the welfare of future generations. The exhaustion issue is most prominent in climate policy, which can be expected to affect transport ever more, but ecosystem integrity and bio-diversity will also conflict with transport policy regularly, at any geographical aggregation level. All in all it means that transport plays an intricate role in

the still open challenge how mankind can attain sustainable development (Himanen et al, 2004). The European Commission adds:

... in 1998 energy consumption in the transport sector was to blame for 28 % of emissions of CO₂, the leading greenhouse gas. According to the latest estimates, if nothing is done to reverse the traffic growth trend, CO₂ emissions from transport can be expected to increase by around 50 % to reach 1.113 billion tonnes in 2010, compared with the 739 million tonnes recorded in 1990. Once again, road transport is the main culprit since it alone accounts for 84 % of the CO₂ emissions attributable to transport. However, internal combustion engines are notorious for their low energy efficiency, mainly because only part of the combustion power serves to move the vehicle. Reducing dependence on oil from the current level of 98 %, by using alternative fuels and improving the energy efficiency of modes of transport, is both an ecological necessity and a technological challenge (European Commission, 2001).

Road transport emissions of SO_x, NO_x and several other substances of relevance to human health and the natural environment were greatly reduced during the 1990s. For instance, road transport emissions of sulphur dioxide were reduced by 70% during the 1990s. This was the result of considerable reductions in the sulphur content of automotive fuels over that period and in spite of increased traffic volumes. Emissions from national navigation (inland waterways and shipping) also decreased by over 7 % due to similar fuel sulphur content restrictions.

However, emissions from civil aviation and international shipping activities have increased substantially due to a lack of similar tightening of regulations. Recent estimates from EMEP

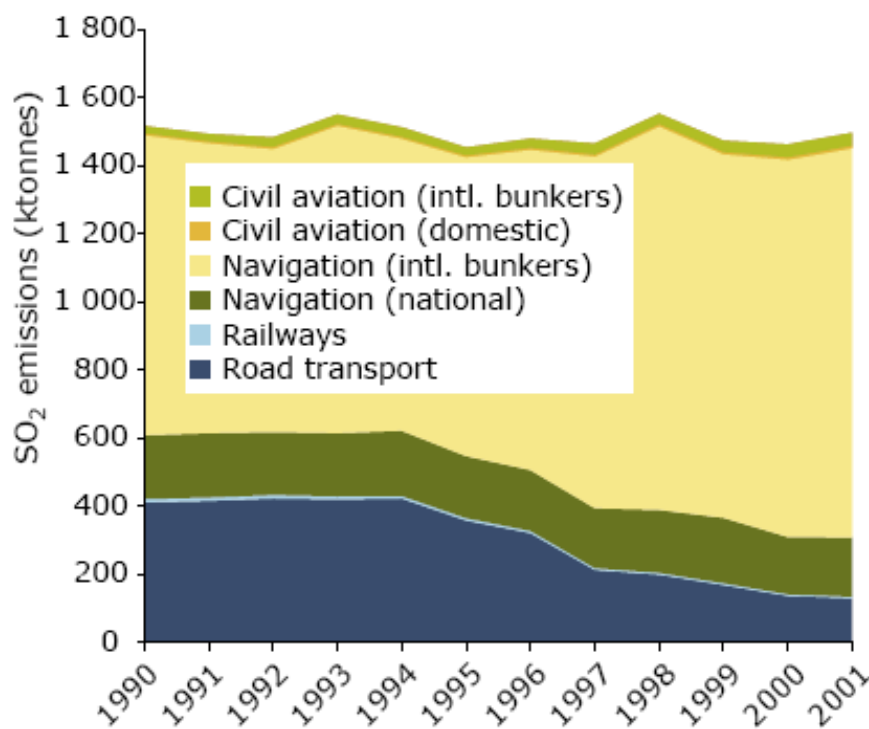


Figure 1: SO₂ emissions from transport (EEA, 2004)

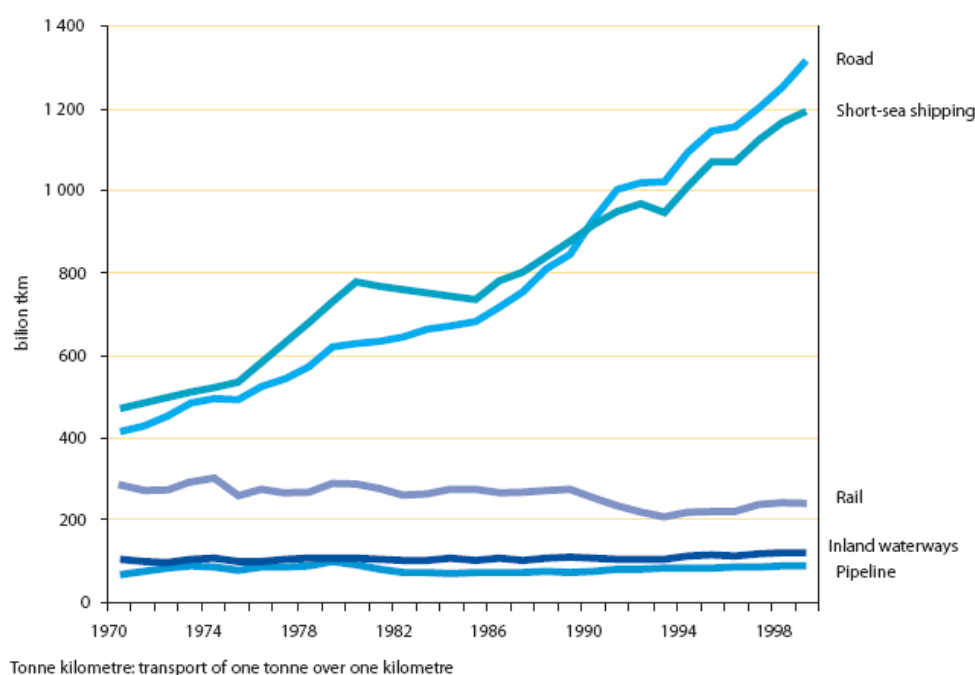
(Environmental monitoring, evaluation and protection programme under the UNECE Convention on Long-Range Transboundary Air Pollution) suggest that emissions of sulphur dioxide from international shipping activities in the European waters may have contributed to as much as 39 % of all SO₂ emissions (all sectors) in the EU-15 countries (EEA, 2004). Other sources (EEB et al, 2004, p.3) also conclude that while pollutant emissions from land-based sources are gradually coming down, those from shipping show a continuous increase:

Even after accounting for enforcement of MARPOL Annex VI, which sets limits on the sulphur content of marine fuels for the Baltic Sea, the North Sea and the English Channel, emissions of SO₂ from international shipping are expected to increase by more than 42 per cent by 2020, and those of NO_x by two-thirds. In both cases, by 2020 the emissions from international shipping around Europe will have surpassed the total from all land-based sources in the 25 member states combined (EEB et al, 2004).

The problems and trends mentioned above refer to important environmental criteria and indicators that reflect the sustainability of the current transport system, such as energy and resource use, CO₂-emissions and emissions of SO_x, NO_x and several other substances with health consequences. Additional environmental or health indicators of relevance to transport can be argued to be: land use, waste, traffic safety and noise pollution.

However, the above mentioned trends also indicate strongly that characteristics of the transport system itself, such as transport modes and transport volumes, should be considered as indicators because they significantly influence the above mentioned environmental and health indicators. Therefore, the actual volumes of transport and the split between different modes of transport (car, bus, rail, ship, etc.) are relevant in establishing indicators.

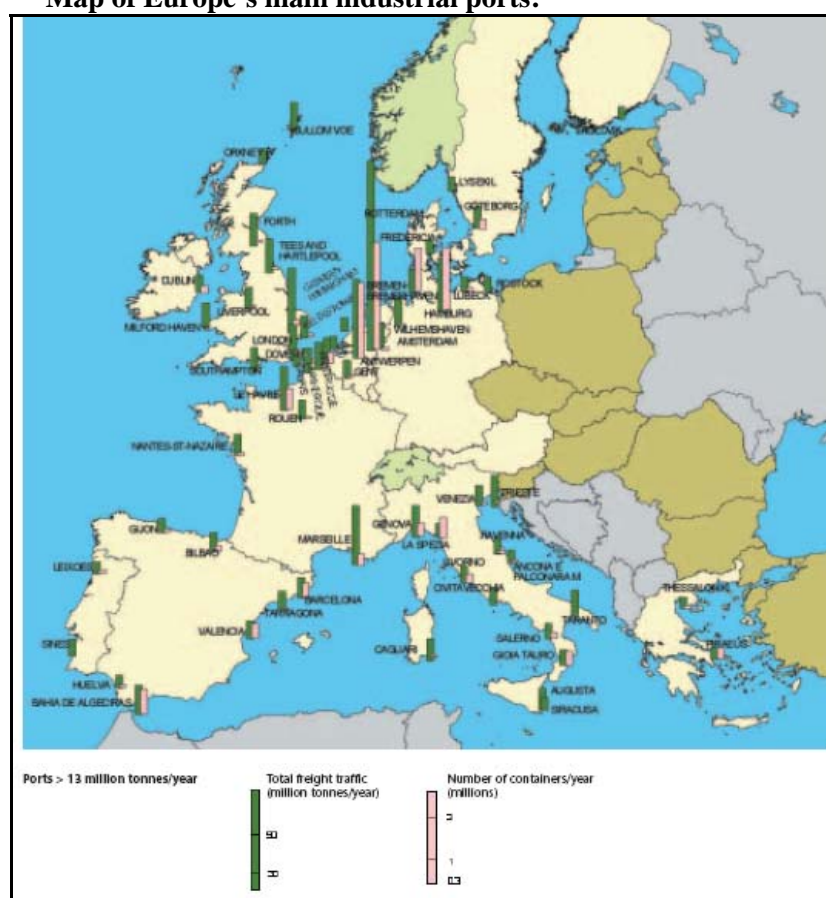
Fig. 2 — Goods transport — Growth of traffic by mode of transport, EU-15: 1970–99



The trends indicated above, as well as the SUTRANET focus on the North Sea Region (see the SUTRANET publications and brochures), strongly suggests that special attention should be given to modes of sea transport when identifying environmental criteria and indicators in this paper. It is often argued or implied that sea transport is among the most environmentally friendly modes of transport. This may hold true in many ways, however the above mentioned trends imply that there are also significant environmental problems related to sea transport that needs to be discussed and handled. In addition, a significant number of Europe's larger industrial ports are located inside or nearby the region (see relevant SUTRANET publications). It means that considerable volumes of transport, of goods in particular, have origin, destination or are passing through the region. This emphasizes further the need for a special focus on transport-environmental problems related to sea transport, but also in relation to port-related and intermodal transport activities.

Hence, this paper will focus primarily on basic environmental criteria and indicators related to sea transport and to port-related and intermodal transport activities. More situation specific criteria and indicators should be developed in relation to each case and problem in order to be able to achieve the maximum effect. See for example two SUTRANET papers from IVL (2007a & b) describing in more detail the 'Environmental impact from sea transportation in the North Sea Region' and 'Spatial and environmental impact of port development'.

Map of Europe's main industrial ports:



Developing environmental criteria and indicators should not just be related to the character and extent of the above mentioned and current transport-environmental problems. It should also be related to a vision of what an environmentally sustainable transport future might actually look like. Such a vision can be useful in setting goals and in particular in identifying relevant indicators that might not be self-evident from the current context. In Hansen et al (2000) a vision has been developed for an environmentally sustainable transport future (2015) in the Nordic countries. In addition, the OECD has developed a similar vision for environmentally sustainable transport in industrialized countries (until 2030). On the background of those studies, as well as that of Aall (2004), input from the Swedish Environmental Research Institute (IVL), and the above described character and extent of current transport-environmental problems, the following ***gross list of environmental criteria and indicators*** related to sea transport as well as port-related and intermodal transport activities in the North Sea Region are suggested:

- ❖ Energy consumption (*MJ*) and resource use (e.g. *tonnes of oil*), including *proportion of renewable fuels*.
- ❖ Greenhouse effect: *CO₂-emissions*.
- ❖ Eutrophication³, acidification and human health: *Emissions to air*, e.g. of *SO_x*, *NO_x* and several other substances with health consequences (as *particles* or *VOC's*). IVL operates with a) *exhaust emissions*, b) *fire extinguishers & refrigerants*, and c) *cargo emissions*.
- ❖ Water pollution: IVL operates with a) *oil spill*, b) *ballast water handling*, c) *paints & antifouling*, d) *garbage*, and e) *cargo loss/leakage*.
- ❖ Effects on wildlife: *Barrier effects*, *underwater noise*.
- ❖ Other effects: (*Air*) *noise*, *intrusion effects*, *land use*, *safety*.

As mentioned earlier, transport system indicators should be observed as well, due to their obvious influence on the character and extent of transport-environmental problems. A chosen main focus on sea transport modes as well as port-related and intermodal transport activities has been argued, mainly because of the increase in environmental problems associated with sea transport.

However, in order to be able to continuously qualify and discuss whatever trends and changes that may occur in sea transport and port-related and intermodal transport activities, it seems evident to compare these with overall transport system developments and changes. In practice, it means that transport system indicators such as transport volumes, modal split, capacity utilization, etc should be observed and applied along the way in order to measure and compare developments and changes. Sub-optimization of parts of the transport system may prove in-efficient, in-economic and environmentally undesirable if such optimization is countered or even surpassed by negative developments in other parts of the transport system – in particular if those negative developments can be argued to be a more or less direct

³ Eutrophication refers to an increase in the primary productivity of any ecosystem. It may occur on land or in water, and is caused by the increase of chemical nutrients.

consequence of the first. It will be difficult to see the overall societal benefit from such actions, and therefore this paper encourages proponents of alleged environmentally sustainable transport solutions to observe and reflect whether such solutions are indeed so when confronted with the bigger picture. E.g. will a specified solution trigger increased negative environmental impacts in other parts of the transport system (or perhaps even in other sectors)?

Hence, the use of transport system indicators can be seen as controlling elements in relation to the use of environmental criteria and indicators. Please see Kristiansen et al. (2005a) for a detailed account of relevant transport system concepts and definitions. These concepts and definitions are useful for any further and in particular case-specific identification of relevant transport system indicators in the North Sea Region. In addition, the paper mentioned focuses on intermodal transport, thus providing an opportunity to avoid the above mentioned negative sub-optimization processes.

Applying Indicators and Doing Environmental Policy Integration

One should observe that indicators can be used for many things. When used within political systems, it is important to decide whether indicators should have an instrumental function in relation to decision-making processes, or whether they should only be used to describe conditions. In the former case, it is important firstly that the indicators can be linked to political objectives, not simply assessments of what it is professionally relevant to describe and secondly that the decision-making processes for which the indicators are to be used are identified. Examples of the latter can be found in connection with annual reports, as a basis for decision-making in case processing and in connection with environmental requirements for public sector procurement schemes (Aall, 2004).

Indicators should be seen as facilitators of a reduction of complexity. The Norwegian Ministry of Finance initiated work concerned with the use of indicators, resulting in the identification of some easily applicable advice (translated as 'Simple signals in a complex world'), see (NTN, 2005):

- Use few indicators
- Indicators must provide a clear message
- Indicators must be associated with political goals
- Indicators must be comparable
- Indicators requires sufficient data
- Indicators must have a character so that changes can be measured easily
- Indicators should be easily applicable in analysis and scenarios.

All indicator systems are dependent on sufficient data. A lack of regional transport data has been identified as a problem in this context (Aall, 2004), and it is therefore necessary to continue to improve the provision of data in this field, in order to be able to further develop, specify and apply indicator systems.

The success of environmental policy integration (EPI) will be affected by the very nature of the sector and the extent to which environmental impacts are inherent to the sector's activities. Overall, efforts to support EPI need to be closely tailored to the particular sector and organisations involved (EEA, 2005). This implies, for instance, that further work with specifying transport-environmental indicators, setting goals, and discussing actual actions to be taken should be carried out in co-operation with transport sector actors, governmental as well as non-governmental.

See Annex A for examples of frameworks and checklists for dealing with and evaluating environmental policy integration. These frameworks and checklists strongly imply that environmental policy integration is very much a social and political activity that depends on close co-operation between sectors, levels and interests.

5 CONCLUSION

This paper has discussed, argued and suggested the establishment and use of the following gross list of environmental criteria and indicators related to sea transport as well as port-related and intermodal transport activities in the North Sea Region:

Criteria	Indicators
Energy consumption and resource use/depletion	MJ, tonnes of oil, proportion of renewable fuels
Greenhouse effect	CO ₂ -emissions
Eutrophication, acidification and human health	Air emissions; SO _x , NO _x , particles, VOC's, etc.
Water pollution	Oil spill, ballast water spill, paints & antifoiling, garbage, cargo loss or leakage
Wildlife	Barrier effects, underwater noise
Other criteria	(Air) noise, intrusion effects, land use, safety

These criteria and indicators are suggested in order to aid a move towards increased environmental policy integration in the transport sector, as most researchers, politicians and planners seem to agree that the present environmental situation can and should be improved. Hence, it has been the intention of this paper to contribute to an on-going process of introducing and imposing environmentally argued policy measures into the transport sector.

In using these criteria and indicators it is important that they are easily applicable and that sufficient data can be found. Furthermore, transport system indicators (e.g. modal split and transport volumes) must be associated with the environmental indicators in order to be able to discuss and assess overall effects and changes. Finally, the indicators must be associated with political goals as well as monitoring systems.

In relation to further use in the SUTRANET project as well as in other projects, it is the intention that these criteria and indicators should be applied, discussed and *specified further* in specific case studies as well as in close co-operation with relevant actors and interests.

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Annex A

The following illustrates an example of a framework for evaluating the integration of environment into sector policies, see (EEA, 2005). Such a framework may be useful for transport policymakers, planners, operators and interest parties.

Figure 1 Framework for evaluating integration of environment into sector policies

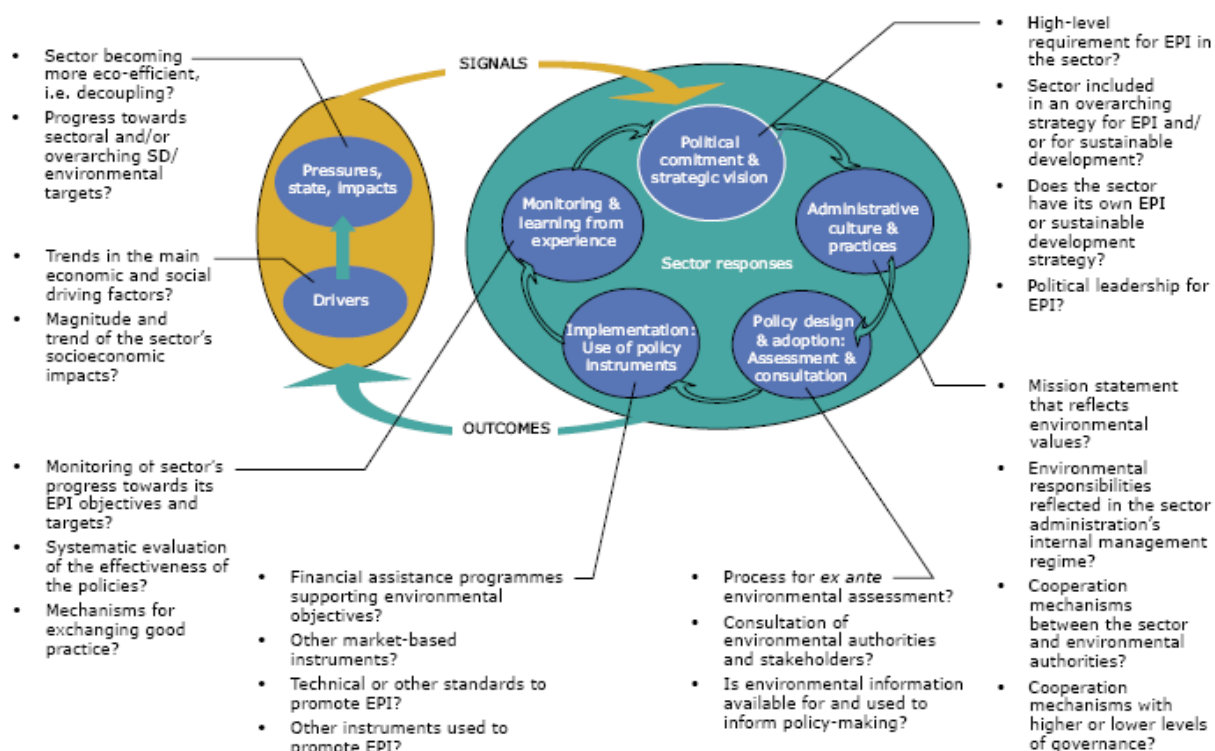


Table 6.3 A checklist of criteria for evaluating sectoral and cross-sectoral EPI

Context for EPI	Cross-sectoral	Sector-specific
1. Trends in drivers, pressures, changes in state of the environment, impacts	1a. What are the main economic and social driving factors facing the administration?	1a. What are the trends in the sector's main economic and social driving factors?
	1b. What is the magnitude and trends of socioeconomic impacts?	1b. What is the magnitude and trend of the sector's socioeconomic impacts?
	1c. Is society becoming more eco-efficient, i.e. decoupling its economic activities and outputs from environmental pressures and impacts?	1c. Is the sector becoming more eco-efficient, i.e. decoupling its economic activities and outputs from environmental pressures and impacts?
	1d. Is progress being made towards key overarching SD/environmental targets and objectives?	1d. Is the sector contributing appropriately to key overarching SD/environmental targets and objectives?
		1e. Is the sector on track to reaching its own environmental targets and objectives?
EPI categories	Cross-sectoral	Sector-specific
2. Political commitment and strategic vision	2a. Is there a high level (i.e. constitutional/legal) requirement for EPI in general?	2a. Is there a high level (i.e. constitutional/legal) requirement for EPI in the sector?
	2b. Is there an overarching EPI or SD strategy, endorsed and reviewed by the prime minister or president?	2b. Is the sector included in an overarching strategy for EPI and/or for sustainable development?
		2c. Does the sector have its own EPI or sustainable development strategy?
	2c. Is there political leadership for EPI and/or sustainable development?	2d. Is there political leadership for EPI in the sector?
3. Administrative culture and practices	3a. Do the administration's regular planning, budgetary and audit exercises reflect EPI priorities?	3a. Does the sector administration's mission statement reflect environmental values?
	3b. Are environmental responsibilities reflected in the administration's internal management regime?	3b. Are environmental responsibilities reflected in the sector administration's internal management regime?
	3c. Is there a strategic department/unit/committee in charge of coordinating and guiding EPI across sectors?	3c. Are there cooperation mechanisms between the sector and environmental authorities?
	3d. Are there mechanisms for cooperation with higher or lower levels of governance?	3d. Are there mechanisms for cooperation with higher or lower levels of governance?

4. Assessments and consultation to underpin policy design and decisions	4a. Does the sector have a process for ex ante environmental assessment of its proposed policies or programmes?	4a. Does the sector have a process for ex ante environmental assessment of its proposed policies or programmes?
	4b. Are environmental authorities and stakeholders engaged in mechanisms for consultation and participation in the sector's policy-making process?	4b. Are environmental authorities and stakeholders engaged in mechanisms for consultation and participation in the sector's policy-making process? [coordinate with sector paper]
	4c. Is environmental information available for and used to inform policy-making?	4c. Is environmental information available for and used to inform policy-making?
5. Use of policy instruments to deliver EPI	5a. Do market-based mechanisms support environmental objectives (eg by removing damaging subsidies or introducing measures to 'get the prices right')?	5a. Do the sector's financial assistance programmes support environmental objectives (eg by introducing positive incentives or removing damaging subsidies)?
	5b. Is spatial planning used to integrate sectoral and environmental issues?	5b. Are other market-based instruments (eg taxes and emissions trading) used to internalise external environmental costs?
	5c. Are environmental management instruments used for EPI, e.g. EMAS, EIA/SEA, eco-labelling, access to information/participation/justice?	5c. Are there technical or other standards to promote environmental objectives in the sector?
	5d. Are other instruments used to promote EPI?	5d. Are other instruments used to promote EPI?
6. Monitoring and learning from experience	6a. Is progress towards sectoral and cross-sectoral EPI objectives and targets regularly monitored?	6a. Is the sector's progress towards its EPI objectives and targets regularly monitored?
	6b. Is there a systematic evaluation of the effectiveness of the policies that have been put in place?	6b. Is there a systematic evaluation of the effectiveness of the policies that have been put in place?
	6c. Are there mechanisms for exchanging good practice?	6c. Are there mechanisms for exchanging good practice?

Annex A. EEA (1999) and OECD (2002) integration criteria

OECA 1999 criteria for assessing environmental policy integration

A Institutional integration	
1	Are environmental objectives (e.g. maintenance of natural capital and ecological services) identified as key sectoral objectives, and as important as economic and social objectives) in a sector integration strategy?
2	Are synergies between economic, environmental and social objectives maximised?
3	Are trade-offs between environmental, economic and social objectives minimised, and transparent?
4	Are environmental targets (e.g. on eco-efficiency) and timetables agreed? And are there adequate resources allocated to achieve the targets within the timetables?
5	Is there effective horizontal integration between the sector; environment; and other key authorities e.g. finance and planning?
6	Is there effective vertical integration between EU, national, regional and local administrations, including adequate public and other stakeholder information and participation measures?
B Market integration	
7	Have environmental costs/benefits been quantified by common methodologies?
8	Have environmental costs been internalised into market prices through market-based instruments?
9	Have revenues from these market-based instruments been directly recycled to maximise behaviour change?
10	Have revenues of these market-based instruments been directly recycled to promote employment?
11	Have environmentally damaging subsidies and tax exemptions been withdrawn or refocused?
12	Have incentives been introduced which encourage environmental benefits?
C Management integration	
13	Have environmental management systems (EMS) been adopted?
14	Is there adequate strategic environmental assessment (SEA) of policies, plans and programmes?
15	Is there adequate environmental impact assessment (EIA) of projects before implementation?
16	Is there an effective 'green' procurement (supplies) programme in public and private institutions?
17	Is there an effective product and services programme that maximises eco-efficiency (e.g. via demand side management; eco-labelling; 'products to services', etc.)?
18	Are there effective environmental agreements that engage stakeholders in maximising eco-efficiency?
D Monitoring/reporting integration	
19	Is there an adequate sector/environment reporting mechanism that tracks progress with the above objectives, targets and tools?
20	Is the effectiveness of the policies and tools for achieving integration evaluated and reported, and the results applied?

Source: EEA, 1999, 'Monitoring progress towards integration, a contribution to the global assessment of the fifth environmental action programme of the EU, 1992-99', working paper.

OECD 2002 checklist for improving policy coherence and integration for sustainable development

Clear commitment and leadership

- Is there a clear commitment at the highest level for the formulation and implementation of sustainable development objectives and strategies?
- Is this commitment effectively communicated to the various sectors of the government machinery and across levels of government?
- When gaps exist between the administrative and political agendas, are specific efforts made to bridge (or fill) them?
- Is leadership expressed through a sequence of priorities over time?
- Is government maintaining a sense of urgency, despite the longer-term nature of the issues related to sustainable development?
- Are pioneer activities of selected agencies and local communities encouraged, rewarded and disseminated?

Specific institutional mechanisms to steer integration

- Is there an institutional 'catalyst' (ministry, select committee, etc.) in charge of enforcing sustainable development strategies?
- Is this 'catalyst' located strategically within the government machinery (e.g. at the level of the Prime Minister's office)?
- Are there specific reviews of laws and regulations to check whether they conflict with sustainable development, and are sustainable development objectives embedded in new legislation and regulations?
- Are there mechanisms to ensure effective feedback between different levels of government?
- Are organisations moving from narrow sectoral perspectives (e.g. agriculture, industry, transport, etc.) to a more 'issues-oriented' agenda (e.g. air quality, mobility, poverty reduction, etc.)?
- Is sustainable development integrated into regular government exercises (e.g. the budget process)?
- Is there a clear framework for assessing the performance of public organisations with regard to sustainable development?
- Are there evaluation and reporting mechanisms to support sustainability appraisal within the public sector (i.e. indicators of progress, cost/benefit analysis, environmental and social impact assessment)? Does government make effective use of these evaluation and reporting mechanisms?
- Have specific external and independent auditing and reporting mechanisms been established?
- Has a body been put in charge of providing guidance to organisations upon request?

Effective stakeholder involvement

- Do effective mechanisms exist within government or independent organisations for informing consumers about the consequences of their consumption decisions?
- Has the legal framework been reviewed and adapted in order to provide clear legal provisions for consultation and participation?
- Are there clear guidelines on when, with whom, and how consultations should be carried out?
- Is a case-by-case approach to policy development being developed at all levels and on the various dimensions of the issues, and is the public involved in this?
- Are mechanisms in place for the evaluation of and feedback on consultation, and for monitoring the influence of participation on decision-making?
- Is transparency ensured? For example, has restricted information been made the exception, not the rule, both in principle and in practice?
- Are transparency mechanisms being reinforced at different levels of government about key decisions?

Effective knowledge management

- Are the mechanisms transparent, supported by arbitration processes (e.g. a 'sustainable development ombudsman'), for managing conflictual knowledge?
- Does government ensure that a framework is in place to allow discussions to focus constructively on areas of disagreement, by developing scenarios and options?
- Given that scientific and technological innovation is critical for sustainable development, is sufficient attention devoted to ensuring that the flows of information between the scientific community and decision-makers are efficient and effective?
- Do research policies encourage and facilitate networks of scientists and do they support the development of 'joined-up' research between disciplines?
- Are specific efforts made to support forward-looking and policy relevant knowledge, in particular through assuring the 'right mix' between public and privately funded investment in research?

Source: OECD, 2002b.